



# CrashHelp and Rural EMS Response

**Lee Munnich  
Thomas Horan**

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# Research Aims

- Our research goal has been to develop and test models and tools to improve technology enabled EMS systems.
- Our focus:
  - How can we more effectively collect, share, and visualize information?
  - How can mobile technologies assist in getting useful information to the Emergency Room in advance of patient arrival?
  - What are the specific information needs of MVC related traumas?

# Research Activities

- **Conceptual Model – 2004-2006**
  - Development of Time-Critical Information Services Model for EMS that emphasizes end-to-end performance
- **Case Study Research – 2005-2009**
  - Two case studies to validate the model and explore best practices: San Mateo County, Mayo Clinic Trauma System
- **Prototype Development and Testing – 2009-2014**
  - Review of Comparative Cases
  - Design and Testing of prototype: CrashHelp

# Background: MVC's and EMS

- Almost 35,000 traffic related fatalities per year
  - Approximately 60% are on rural roads, 70% in Minnesota
- Medical and emergency service costs are roughly 15 percent of the cost of MVC's.
- According to CDC, the cost of medical care and productivity losses from motor vehicle crash injuries as approaches \$100 billion.
- **Timely** and **effective** emergency medical response to MVC's can significantly reduce the likelihood of death, disability, and economic consequences.

# Research Findings



- Major Gaps Information exchange from **pre-hospital** to **hospital**

# CrashHelp High Level Design Principles

- Facilitates information hand-off *at or before* patient hand-off to ED
- Facilitates coordination across EMS organizations
- Little interference with current medical care processes and practices
- Value added context to decision makers at ED/Trauma Center
- Secure
- User friendly
- Leverages new technologies

# CrashHelp System Prototype

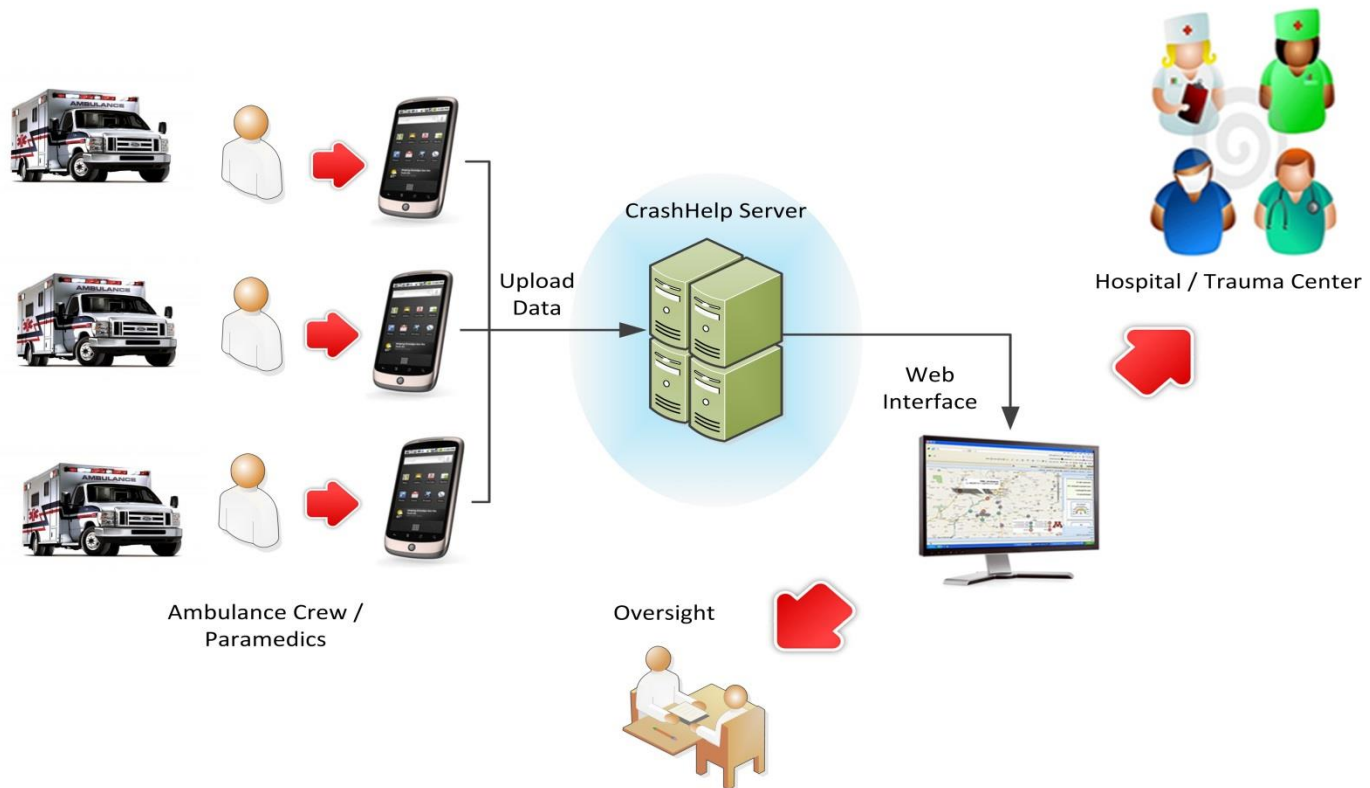


**For: EMT's / Paramedics in the field**  
Google Android Compatible Phone  
Android Application



**For: Emergency Department /  
Trauma Center**  
Web based interface

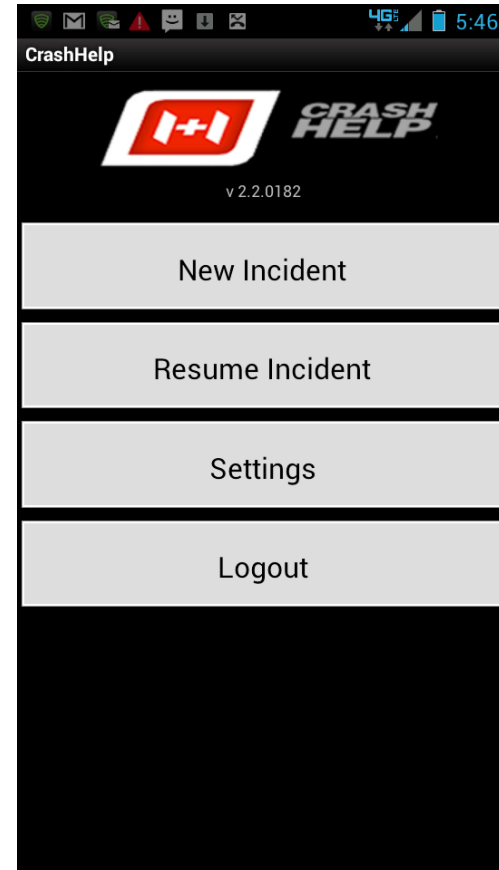
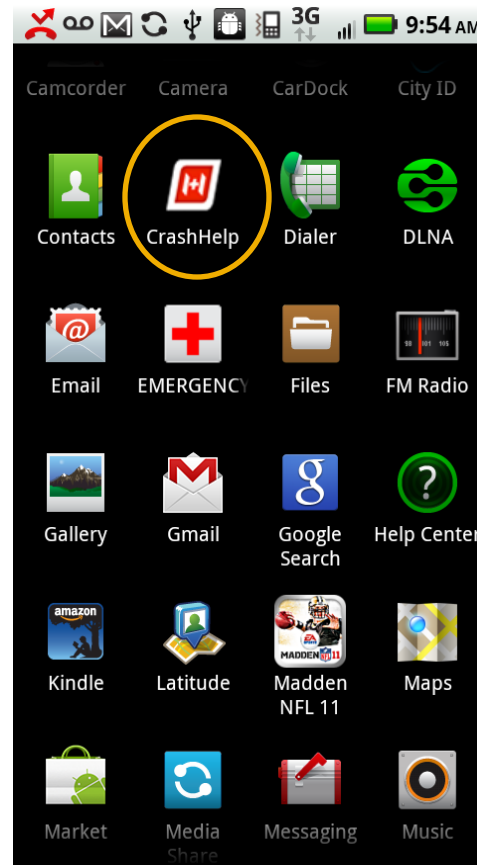
# CrashHelp System Architecture





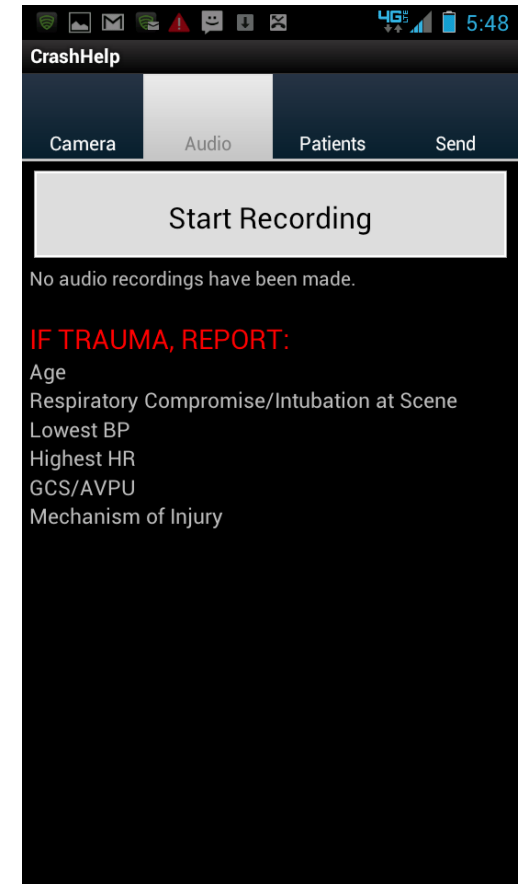
# Mobile Phone Application

- Secure login
- Add new Incident
- Review existing incidents



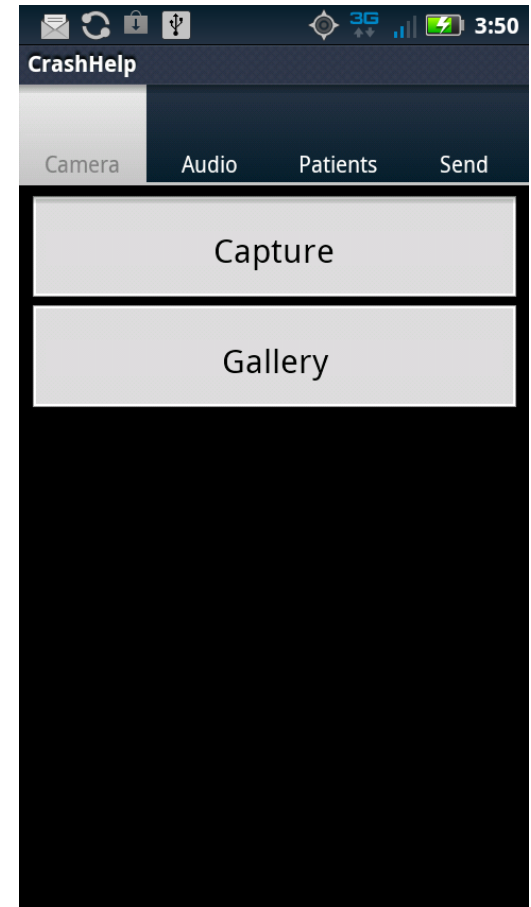
# Mobile Phone Application

- Record audio messages, Paramedic/EMT verbal snapshot:
- Vitals
- Origin of incident
- Mechanism of Injury
- Treatments given
- Other: e.g., patient history



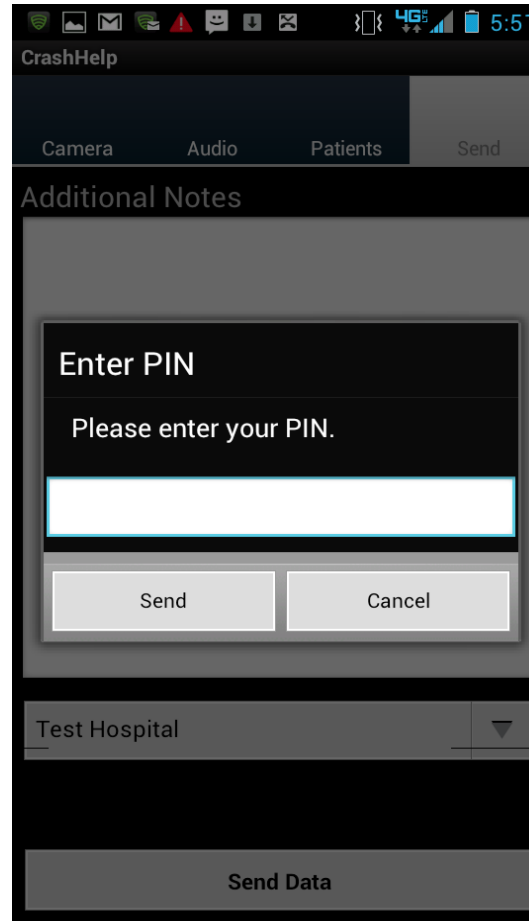
# Mobile Phone Application

- Take Pictures and Video

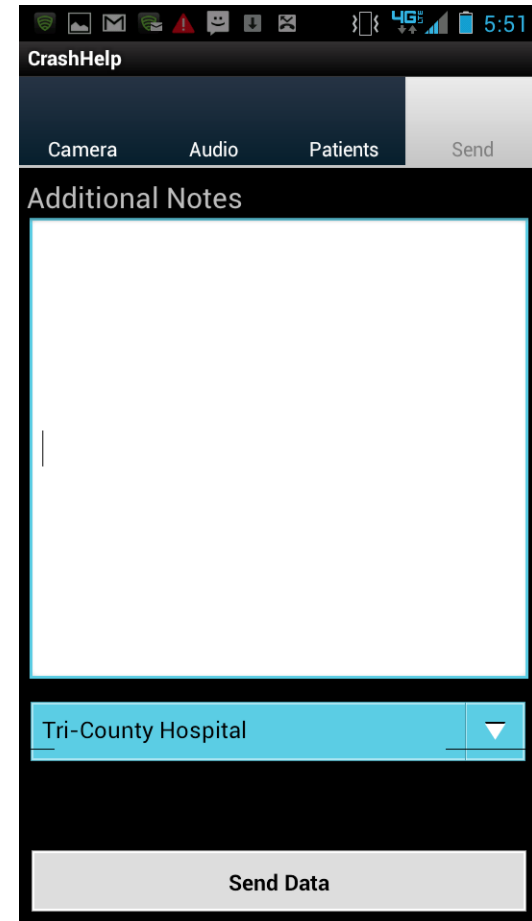


# Mobile Phone Application

- Choose destination
- Get location
- Send phone number
- Send EMS personnel info
- Send data
- Data encrypted and stored securely on device and is “purged” after sending
- Data sends only when phone has a connection
- Text message sent to ED staff member



The screenshot shows the CrashHelp app interface. At the top, there's a status bar with various icons and the time 5:51. Below the status bar, the app title "CrashHelp" is displayed. A navigation bar contains four tabs: "Camera", "Audio", "Patients", and "Send". The "Patients" tab is currently selected. Below the navigation bar, there's a section titled "Additional Notes" with a large text input area. Overlaid on this is a modal dialog box titled "Enter PIN" with the text "Please enter your PIN." and a text input field. Below the input field are two buttons: "Send" and "Cancel". At the bottom of the screen, there's a dropdown menu showing "Test Hospital" and a "Send Data" button.




The screenshot shows the CrashHelp app interface. At the top, there's a status bar with various icons and the time 5:51. Below the status bar, the app title "CrashHelp" is displayed. A navigation bar contains four tabs: "Camera", "Audio", "Patients", and "Send". The "Patients" tab is currently selected. Below the navigation bar, there's a section titled "Additional Notes" with a large text input area. At the bottom of the screen, there's a dropdown menu showing "Tri-County Hospital" and a "Send Data" button.

# Web Application




# Web Application



**CRASH  
HELP** A MOBILE & MULTI-MEDIA EMS APPLICATION


next update in 4 seconds | [logout](#)




What's new?

Updated: 07-03-2012










Tri-County Hospital



LIST VIEW




MAP VIEW

<p>INCIDENT</p> <div>  <p>26</p> </div> <p>Date: Today Time: 3:26:37 PM Distance: 6 miles ETA: 9 minutes Status: Enroute</p>	<p>PATIENT(S)</p> <div>  <p>Medic 1</p> </div> <p>Name: Gender: Female Age: 31 Years DOB: 00-00-0000 na Alert</p> <div>  <p>30+ minutes elapsed</p> </div>	<p>MEDIA</p> <p>Photos (2) Video (0) Audio (0) Notes (0)</p> <p> Details  Send SMS(2)</p>
<p>INCIDENT</p> <div>  <p>24</p> </div> <p>Date: Today Time: 11:26:43 AM Status: Arrived</p>	<p>PATIENT(S)</p> <div>  <p>Medic 1</p> </div> <p>Name: test Gender: Male Age: 50 Years DOB: 5-4-1963 e</p>	<p>MEDIA</p> <p>Photos (0) Video (0) Audio (1) Notes (0)</p> <p> Details  Send SMS(1)</p>


# Web Application

### INCIDENT



**Date:** Today  
**Time:** 3:26:37 PM  
**Distance:** 6 miles  
**ETA:** 9 minutes  
**Status:** Enroute

### PATIENT(S)



31

### MEDIA

30+ minutes elapsed

Photos (2)  
Video (0)  
Audio (0)

Sent by Julie Jensen

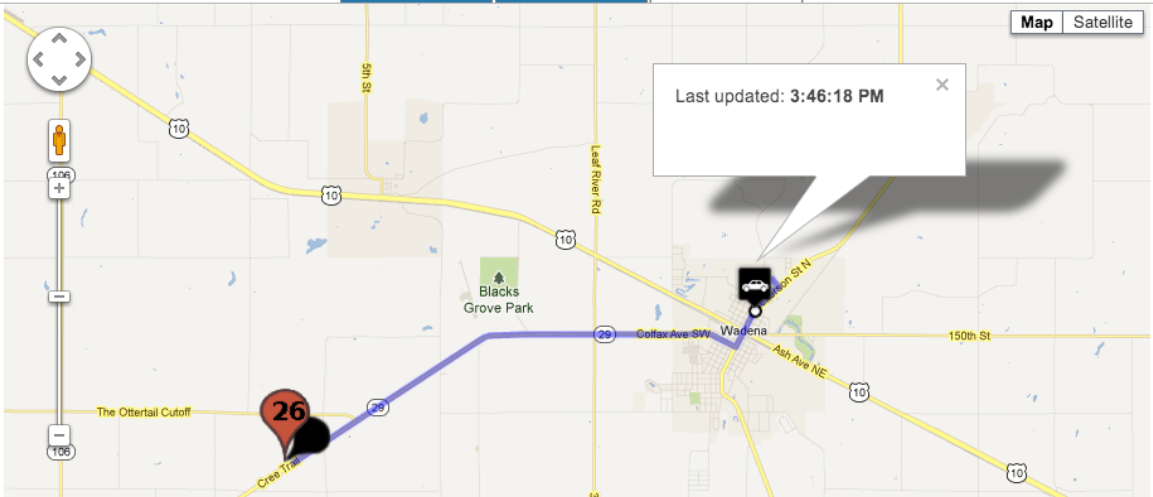
Unit : Medic 1  
2186390772

### Incident Details

PhotoVideo & AudioMap

MapSatellite

Last updated: 3:46:18 PM





# CrashHelp Video



<https://www.youtube.com/watch?v=NT51-O-gO8I>

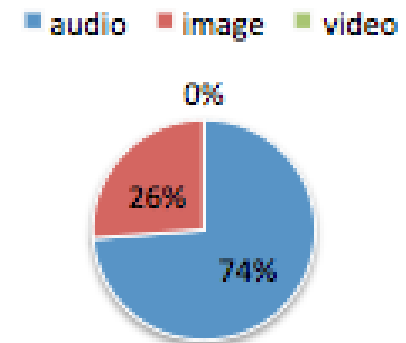


## Pilot Testing and Evaluation Goals: Wadena, Cayuna

- Improved information collection by on-scene EMS personnel
- Improved communication between pre-hospital transport and hospital organizations (ED / Trauma)
- Improved care decision making by hospital personnel (for some incidents)
- Improved resource utilization by hospital personnel

# Cuyuna Use: Summary Usage Stats

- Total Live Reports Sent: 88
- Total Live Reports Acknowledged: 80
- Total Medics Used: 13
- Total Audio Files Sent: 86
- Total Pictures Sent: 41
- Total Videos Sent: 0



# Cuyuna Interview Themes

- EMS communications: generally ease to use, audio preferred, data that time consuming wireless coverage gaps, close-in runs problematic

“I thought that not only was the phone was pretty self explanatory... I think it was pretty simple to use. Straightforward, had enough tools there, but not so polluted .”

“I really think that there would be some really good value in using it more to crash scenes.”

# Cuyuna Interview Themes

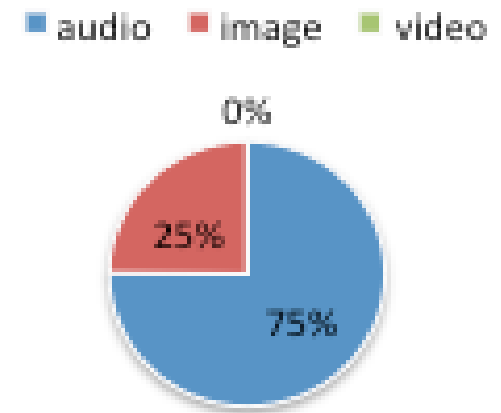
- **ED usage: added in preregistration and preparation, clinical impact more nebulous**

“It helps us to get people through faster...that was a huge asset to us as getting people registered and being able to order stuff on them, being able to pull meds out for them and stuff like that...”

“The ED physician, on seeing the image [of a deep tissue laceration], actually went ahead and, before the patient even arrived, contacted the surgeon and said, you know, I anticipate we’re gonna need your involvement based on what I’m seeing here. And it just kind of expedited getting the surgeon here.”

# Use: Summary Usage Stats (Wadena)

- Total Live Reports Sent: 239
- Total Live Reports Acknowledged: 145
- Total Medics Used: 11
- Total Audio Files Sent: 163
- Total Pictures Sent: 54
- Total Videos Sent: 0

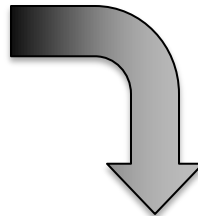


Last updated May 13, 2013

# Trauma Reporting (Information Matters The Most)

EMS/Report/Trauma  
Please ask for the following information  
Encourage early reporting

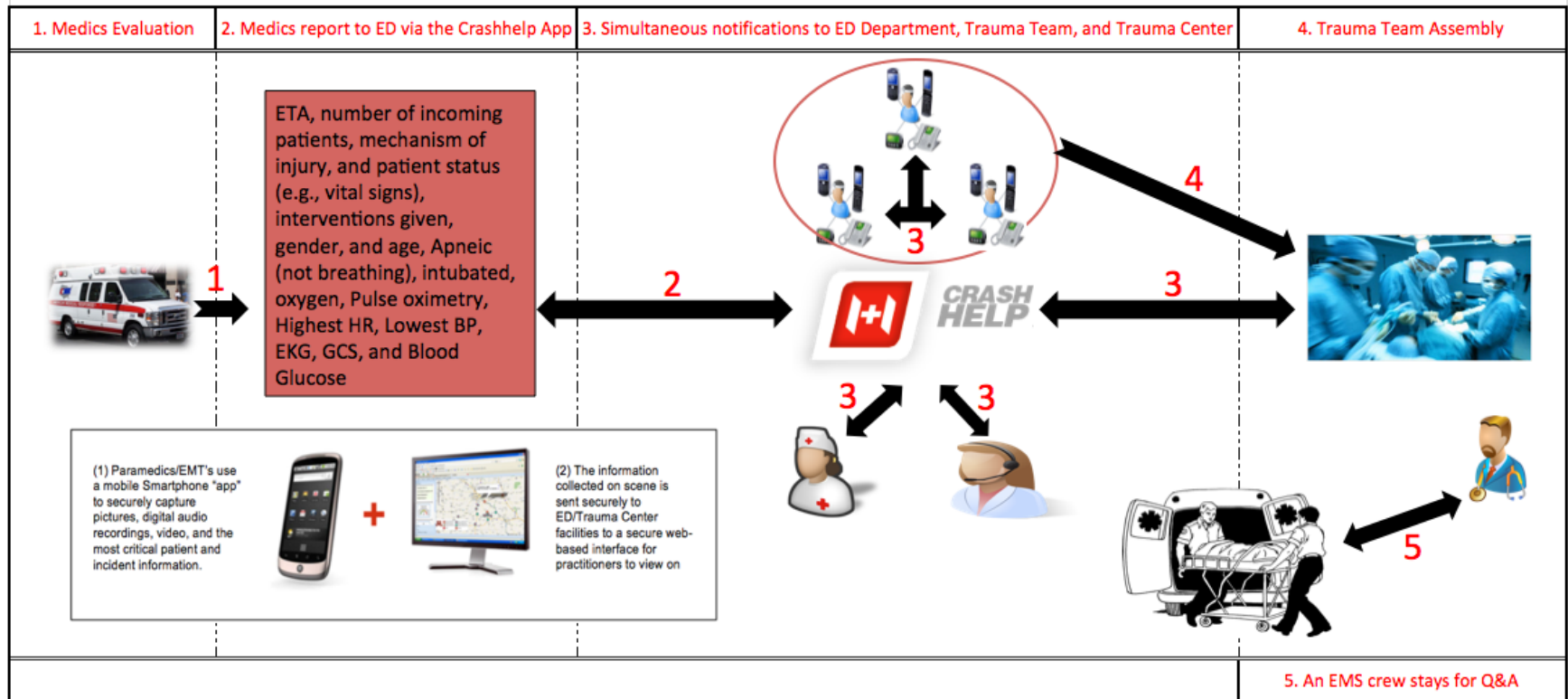
Respiratory compromise/intubation at scene  
Lowest BP  
Highest HR  
GCS/AVPU  
Mechanism of Injury  
Age



Criteria	"Must know" Information
Airway/Breathing	<b>Intubated</b> , Apneic (not breathing), oxygen, Pulse oximetry (value ~ 90%)
Circulatory	<b>Lowest BP, Highest Heart Rate</b> , EKG (for chest pain or if found unconscious)
Neurologic	<b>GCS</b>
Other Considerations	<b>Mechanism of Injury</b> , Blood Glucose
Geriatric Patients	<b>Age &gt; 65</b> -> upgrade trauma level Pregnant Patient -> upgrade trauma level

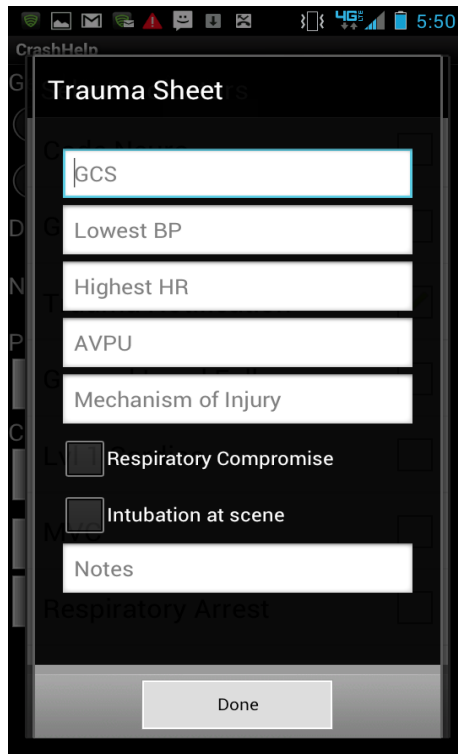
# Trauma Scenario Using The CrashHelp's Capabilities

## Draft: **An Enhanced** Trauma Scenario



# EMS Response: "Red Card" Implementation on CrashHelp

## EMS Mobile Phone Screen



**Trauma Sheet**

GCS

Lowest BP

Highest HR

AVPU

Mechanism of Injury

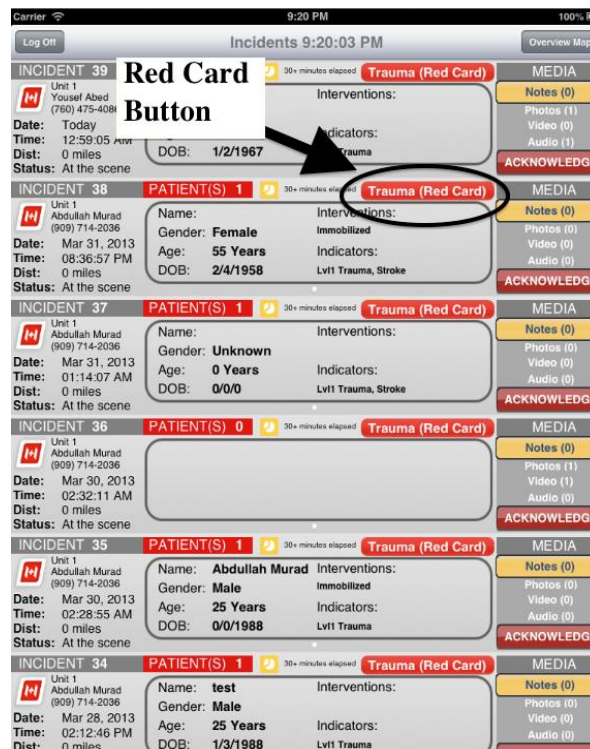
☐ Respiratory Compromise

☐ Intubation at scene

Notes

Done

## ED iPadScreen- General



**Red Card Button**

Incidents 9:20:03 PM

Incident	Patient(s)	Time	Status	Red Card
INCIDENT 39	Unit 1 Yousef Abed (760) 475-4088	Date: Today Time: 12:59:05 PM Dist: 0 miles Status: At the scene	Interventions: Indicators: Trauma	Trauma (Red Card)
INCIDENT 38	Unit 1 Abdullah Murad (909) 714-2036	Date: Mar 31, 2013 Time: 08:36:57 PM Dist: 0 miles Status: At the scene	Interventions: Indicators: Lvl1 Trauma, Stroke	Trauma (Red Card)
INCIDENT 37	Unit 1 Abdullah Murad (909) 714-2036	Date: Mar 31, 2013 Time: 01:14:07 AM Dist: 0 miles Status: At the scene	Interventions: Indicators: Lvl1 Trauma, Stroke	Trauma (Red Card)
INCIDENT 36	Unit 1 Abdullah Murad (909) 714-2036	Date: Mar 30, 2013 Time: 02:32:11 AM Dist: 0 miles Status: At the scene	Interventions: Indicators: Lvl1 Trauma	Trauma (Red Card)
INCIDENT 35	Unit 1 Abdullah Murad (909) 714-2036	Date: Mar 30, 2013 Time: 02:28:55 AM Dist: 0 miles Status: At the scene	Interventions: Indicators: Lvl1 Trauma	Trauma (Red Card)
INCIDENT 34	Unit 1 Abdullah Murad (909) 714-2036	Date: Mar 28, 2013 Time: 02:12:46 PM Dist: 0 miles Status: At the scene	Interventions: Indicators: Lvl1 Trauma	Trauma (Red Card)

## ED iPad Screen Details



**Red Card**

Pre Hospital Data

Mode of transportation: Air Auto  
**Ambulance**

Time event occurred: Mar 30, 2013 02:28:55 AM

Trauma Report:

respiratory compromise  
**intubation at scene**

GCS: 25 Heart Rate: 344/566  
BP: 57 AVPU: response

Mechanism of injury: mvc

Notes:

Details: Patient: Abdullah Murad  
25 Years old Male  
Indicators: Lvl1 Trauma ,  
Interventions: Immobilized



# Conclusions

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- Mobile EMS has promise in rural areas.
- Mobile access was generally available, with the notable exception of outlying areas.
- Currently, there is not a sustainable business model for bringing such innovations for rural regions



# Discussion & Questions

## Thanks!

